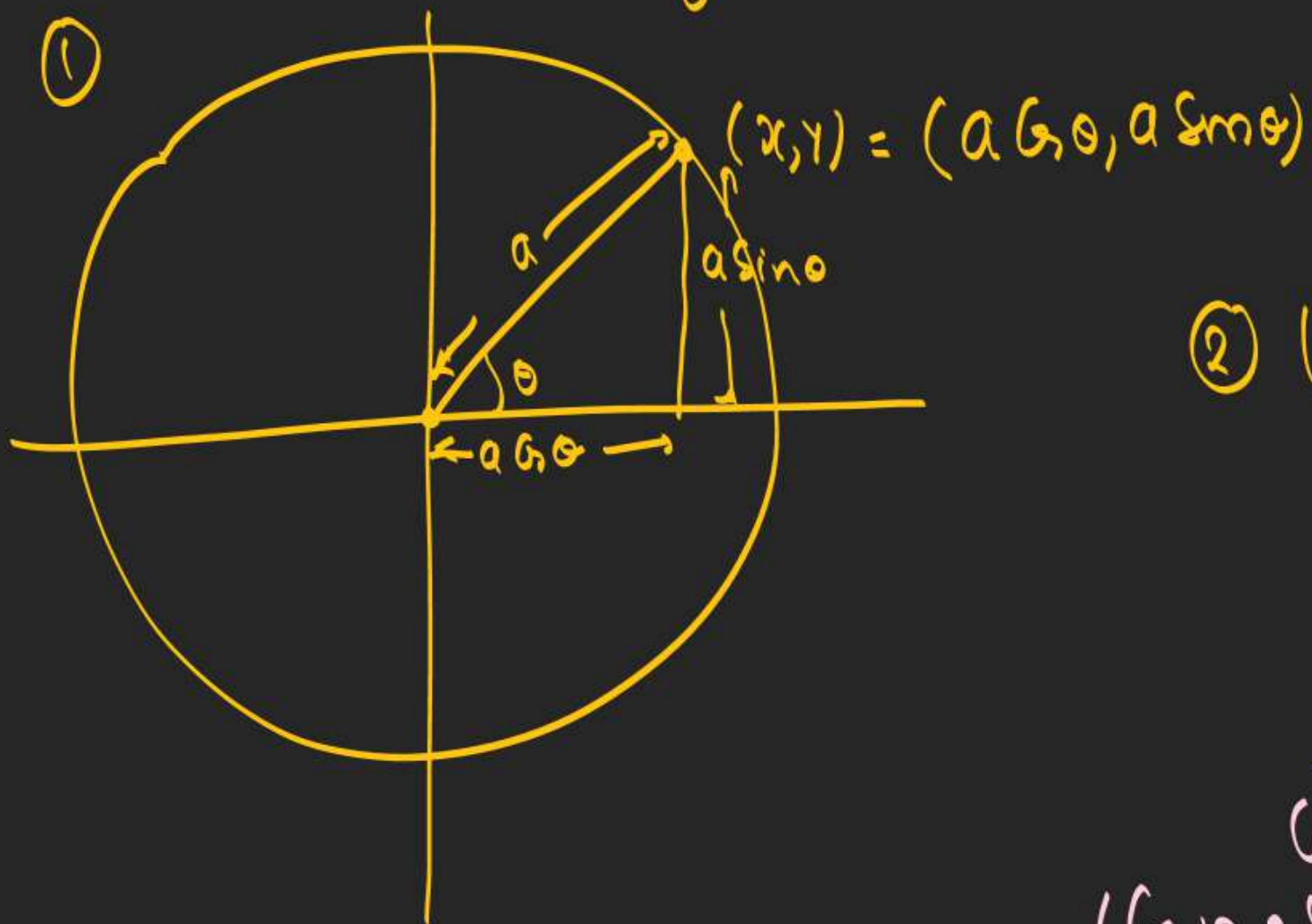


New Chapter $\rightarrow$ Trigo Ph 1.Seqⁿ & Pro

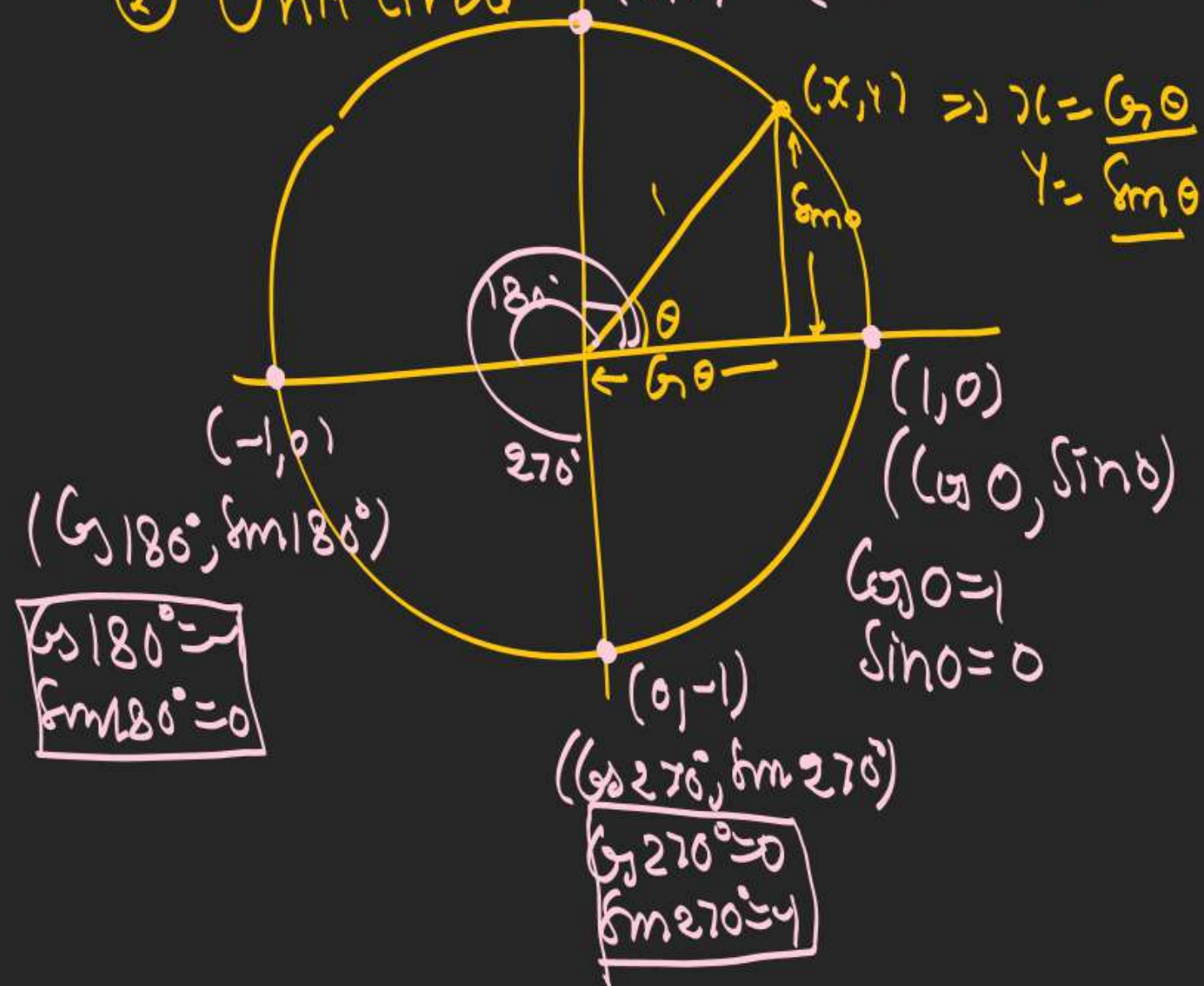
$$x = a \cos \theta$$

$$y = a \sin \theta$$

$$\cos 90^\circ = 0$$

$$\sin 90^\circ = 1$$

② Unit Circle $(0, 1) = (\cos 90^\circ, \sin 90^\circ)$

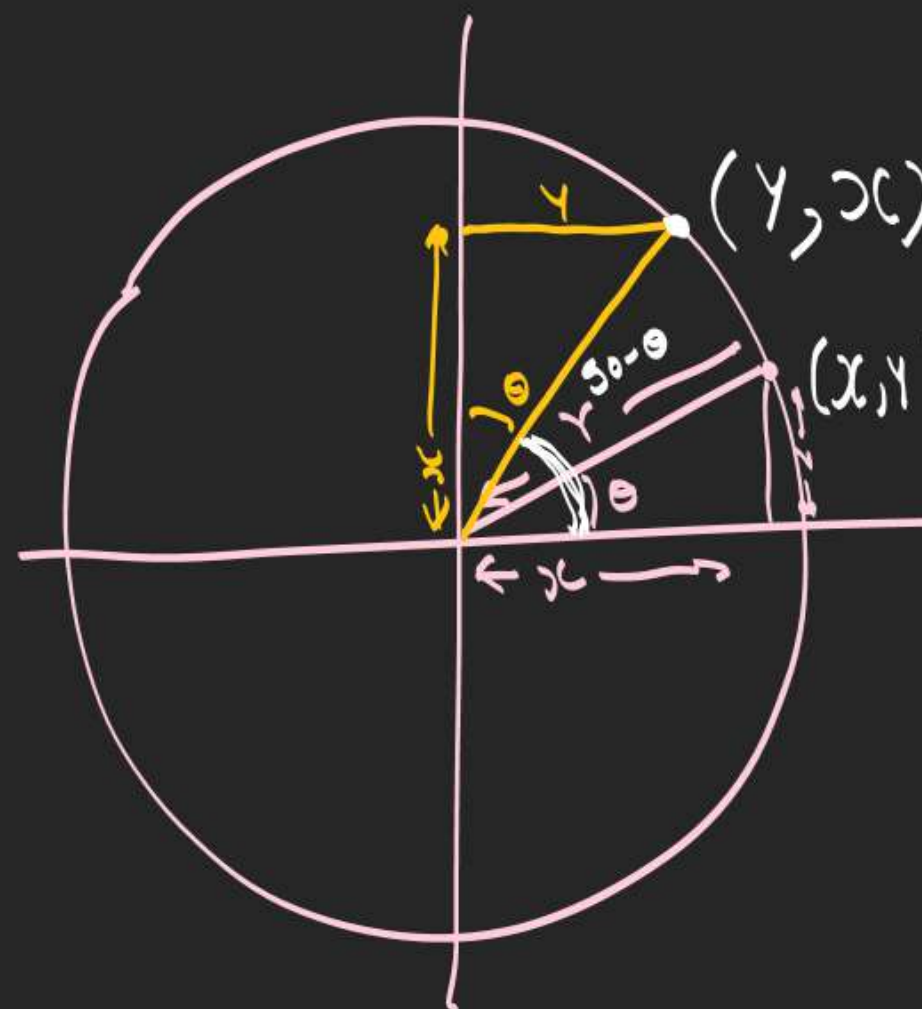


(3) Real Defination of $\sin \theta$, $\cos \theta$

$$\cos \theta = \frac{x \text{ coordinate}}{r}$$

$$\sin \theta = \frac{y \text{ coordinate}}{r}$$

$$x = r \cos \theta$$



4) Reduction formulae.

$$\sin(90 - \theta) = \frac{x}{r} = \cos \theta$$

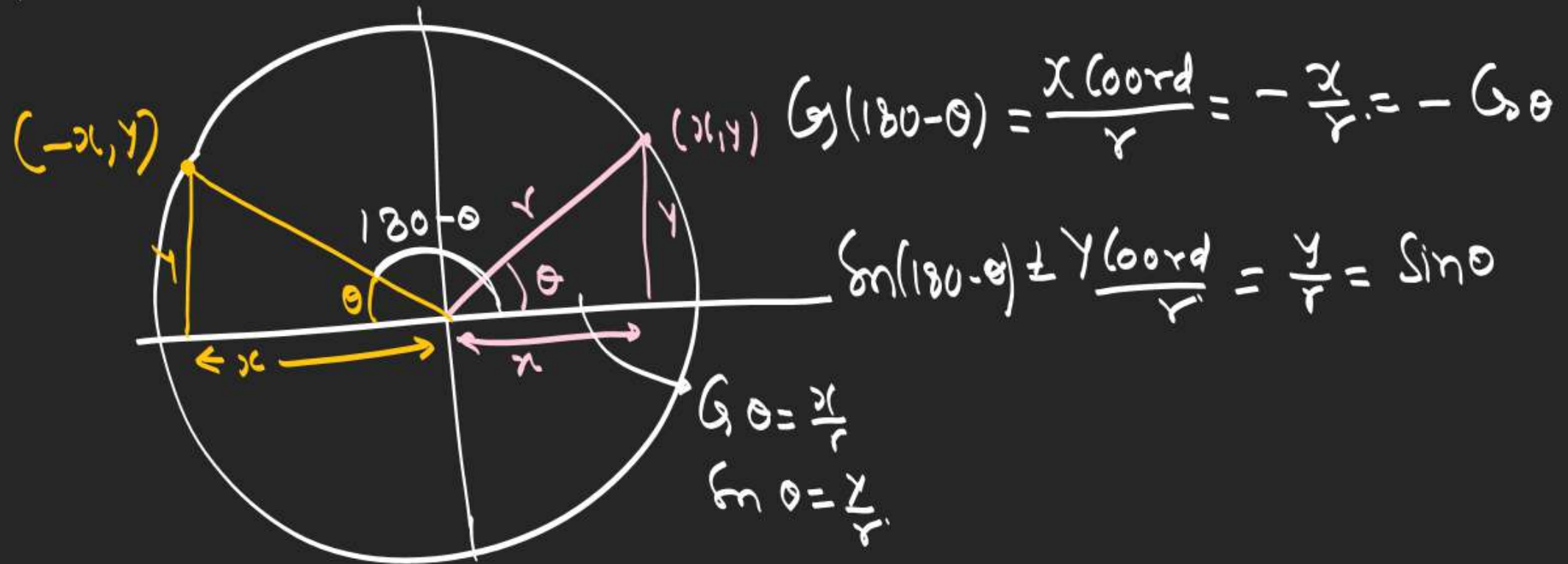
$$\cos(90 - \theta) = \frac{y}{r} = \sin \theta$$

$$\tan(90 - \theta) = \cot \theta$$

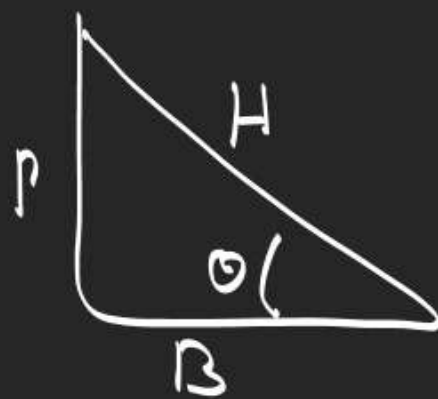
$$\sec(90 - \theta) = \csc \theta$$

$$\csc(90 - \theta) = \sec \theta$$

$(180-\theta)$ Reduction Kese?



5) Basic (Purana) concept.



$$P^2 + B^2 = H^2$$

$$\frac{P^2}{H^2} + \frac{B^2}{H^2} = 1$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\sin \theta = \sqrt{1 - \cos^2 \theta}$$

$$\cos \theta = \sqrt{1 - \sin^2 \theta}$$

Identities

$$1) \sin^2 \theta + \cos^2 \theta = 1$$

$$2) \sec^2 \theta - \tan^2 \theta = 1$$

$$3) \csc^2 \theta - \cot^2 \theta = 1$$

$$4) \csc^2 \theta - \cot^2 \theta = \csc^2 \theta - \cot^2 \theta$$

$$5) \tan^2 \theta - \sec^2 \theta = \tan^2 \theta - \sec^2 \theta$$

$$6) \sin^4 \theta + \cos^4 \theta = 1 - 2 \sin^2 \theta \cos^2 \theta$$

$$7) \sin^6 \theta + \cos^6 \theta = 1 - 3 \sin^2 \theta \cos^2 \theta$$

Q. P.T.

$$\frac{\sin x + \sec x}{\sec^3 x} = \tan^3 x + \tan^2 x + \tan x + 1$$

$$\text{LHS} \Rightarrow \frac{\sin x}{\sec^3 x} + \frac{1}{\sec^2 x}$$

$$\tan x \cdot (\sec^2 x) + \sec^2 x$$

$$\sec^2 x (\tan x + 1)$$

$$(1 + \tan^2 x) (\tan x + 1)$$

$$\tan^3 x + \tan^2 x + \tan x + 1 = \text{RHS}$$

Q If $\sec^4 x - 6\sec^2 x + 2 = \frac{15}{4}$
 then $\tan x = ?$

$$(\sec^4 x - 2\sec^2 x + 1) - (4\sec^4 x - 2\sec^2 x + 1) = \frac{15}{4}$$

$$(\sec^2 x - 1)^2 - (4\sec^2 x - 1)^2 = \frac{15}{4}$$

$$(\tan^2 x)^2 - (4\sec^2 x)^2 = \frac{15}{4}$$

$$\tan^4 x - 16\sec^4 x = 4 - \frac{1}{4}$$

$$\tan^4 x = 4$$

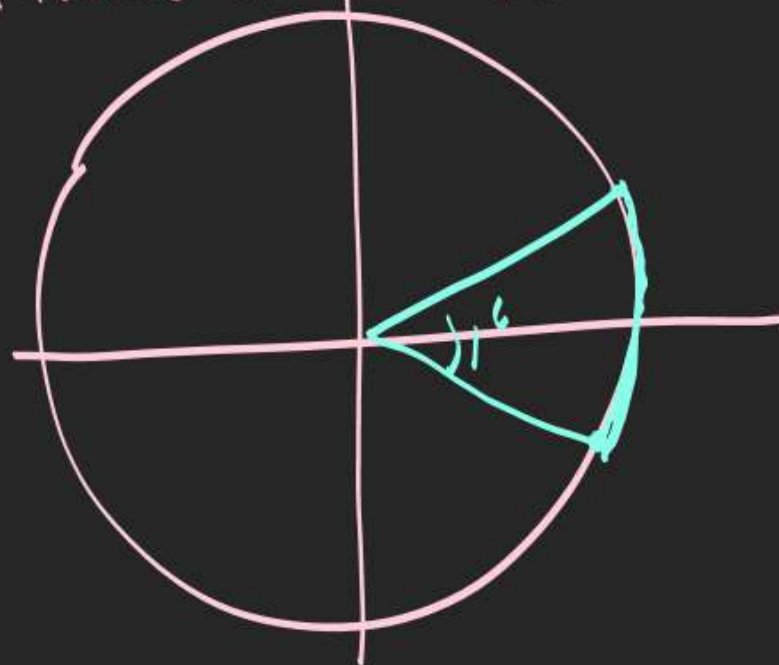
$$\tan^2 x = 2$$

$$\tan x = \sqrt{2}, -\sqrt{2}$$

(6) Definition of Radian.

Angle created by an Arc of length equal to its Radius in 1^R

5 cm Radius Circle & 5 cm Arc make 1^R at its centre.

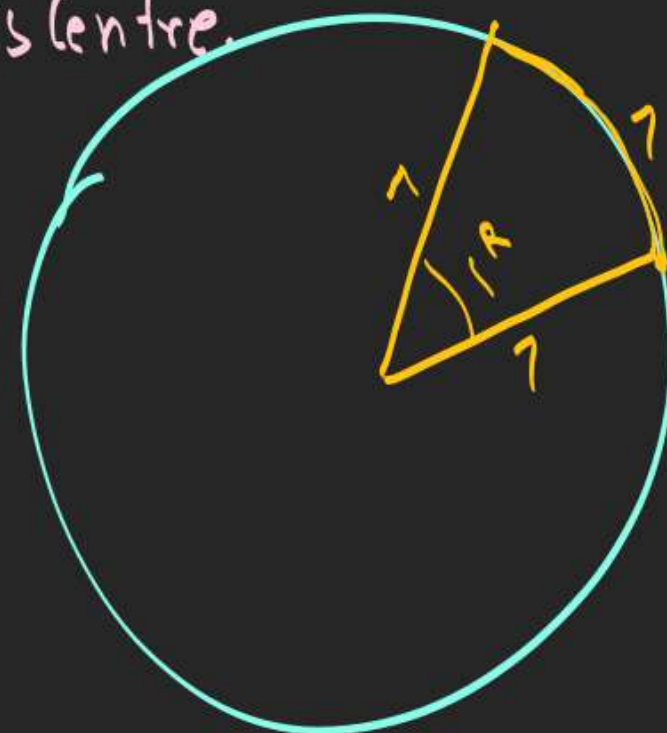


When Radius = Arc length.

then Angle = 1^R

$$\theta = \frac{\text{Arc}}{\text{Rad}} \rightarrow \text{By this formula}$$

Whenever we get value of θ , that comes in Radian.

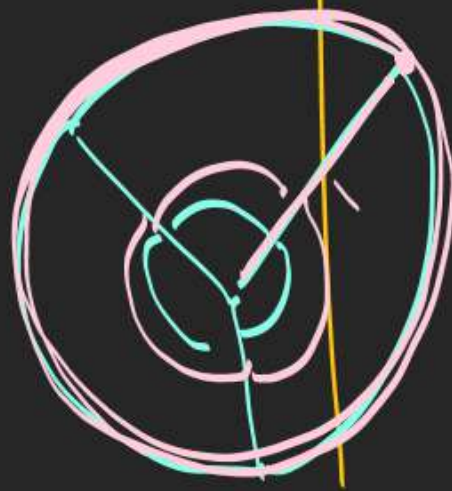


Q Convert 75° into Radian.

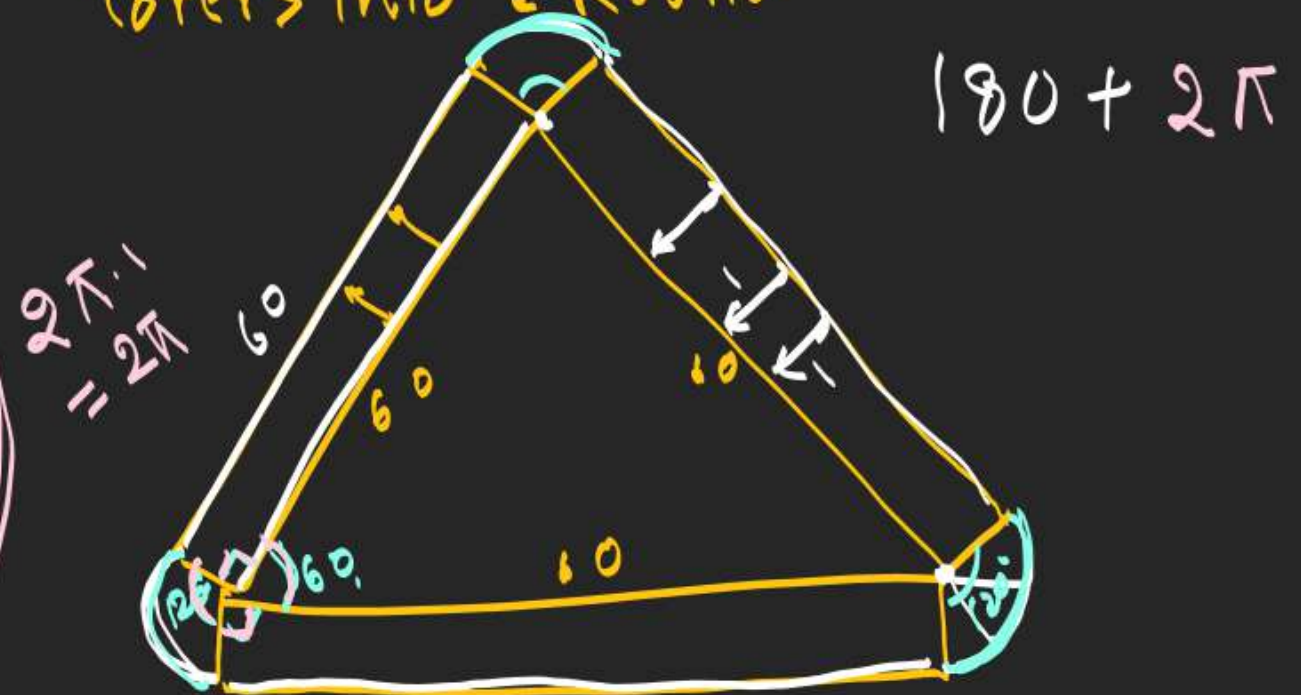
$$\frac{5}{\cancel{75}} \times \frac{\pi}{\cancel{180}_2} = \frac{5\pi}{12}$$

Q Convert 315° into Radian?

$$\frac{2+7}{\cancel{315}} \times \frac{\pi}{\cancel{180}_4} = \frac{7\pi}{4}$$



Q A Equilateral Δ of side 60m is in the shape of a garden. Now if man runs in such a way that his distance from the side of Δ remains 1 meter always. How much distance he covers into 1 Round.



Q A garden is in shape of sqⁿ of side 40m.

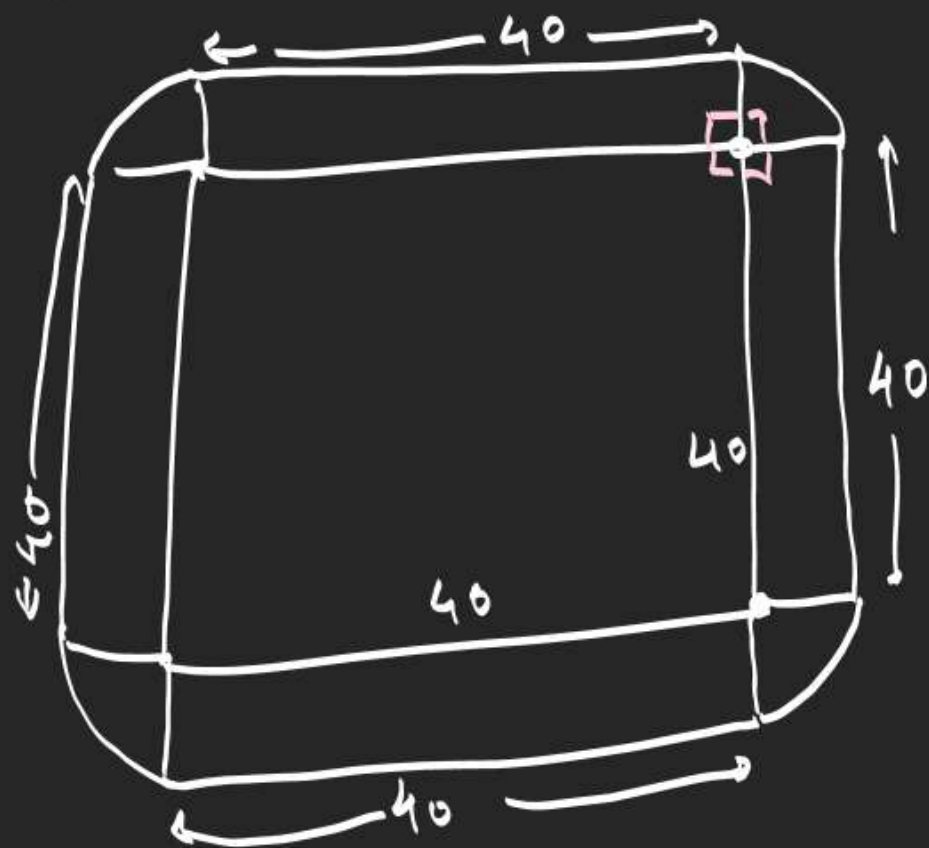
Now if man runs in such a way that ~~at~~ his

distance from side of sqⁿ is 2m Always.

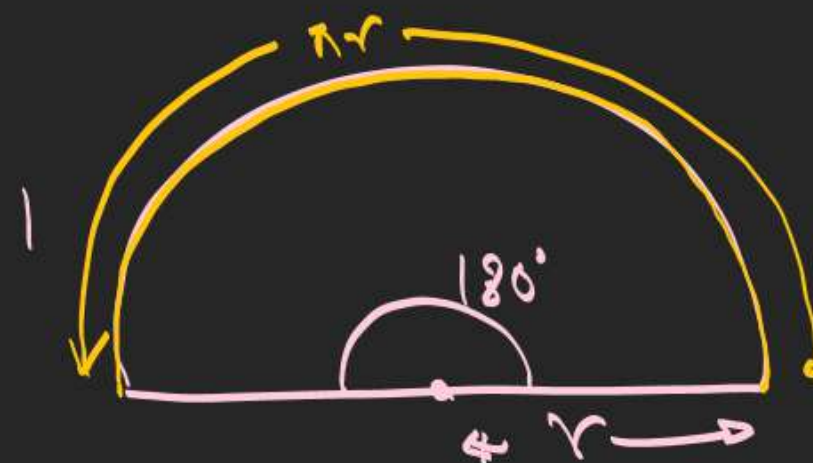
How much dist. he covers in 1 Round.



2m x 2



160 +
4π

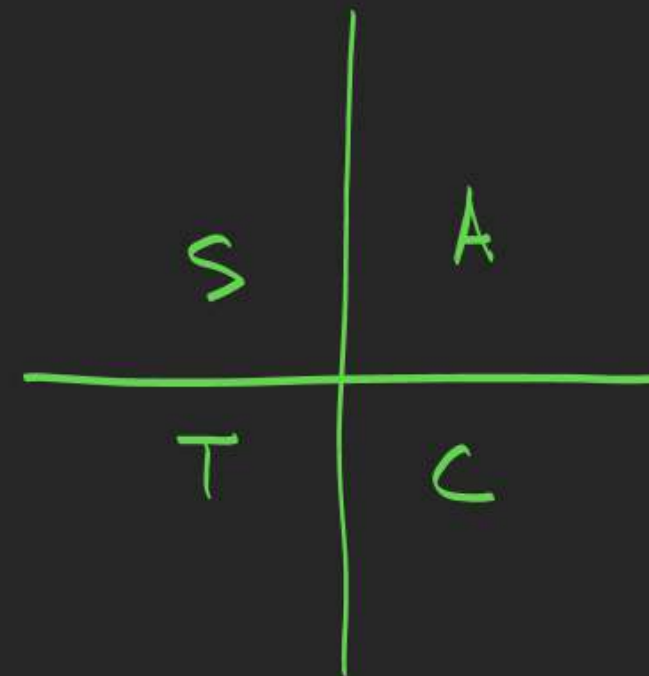


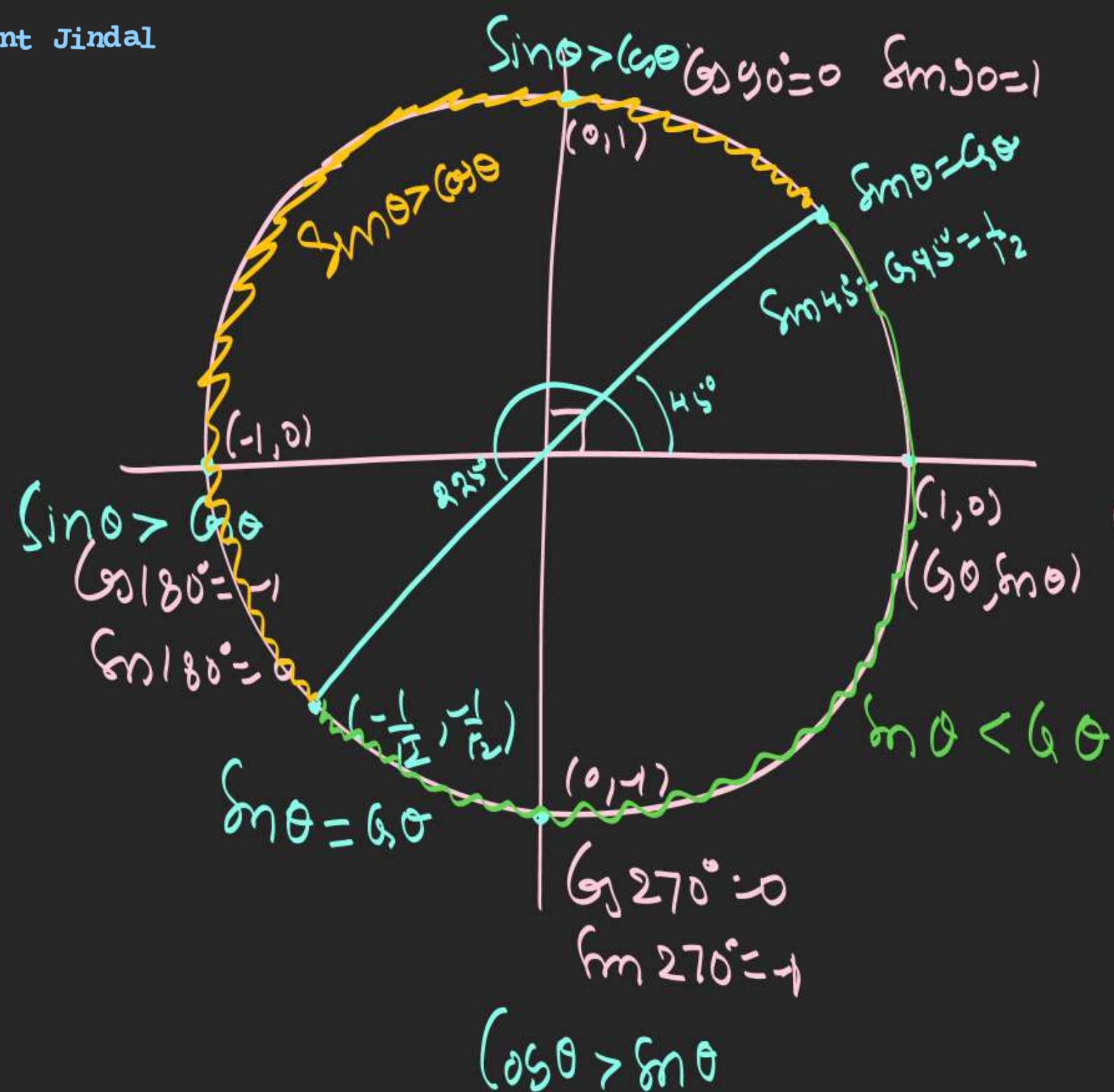
$$\theta = \frac{\pi r}{r} = \pi^c = 180^\circ$$

$$1^c = \frac{180^\circ}{\pi} = \frac{180^\circ}{3.14} \approx 57^\circ$$

$\sin 1^\circ > 0$	$\cos 1^\circ > 0$
$\sin 2^\circ > 0$	$\cos 2^\circ < 0$
$\sin 3^\circ > 0$	$\cos 3^\circ < 0$
$\sin 4^\circ < 0$	$\cos 4^\circ < 0$
$\sin 5^\circ < 0$	$\cos 5^\circ > 0$
$\sin 6^\circ < 0$	$\cos 6^\circ > 0$
$\sin 7^\circ > 0$	$\cos 7^\circ > 0$

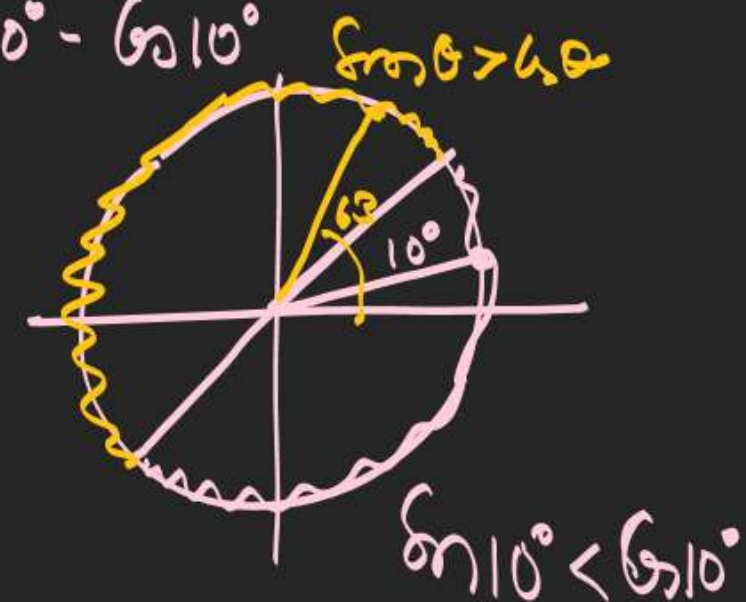
$1^\circ \approx 57^\circ \rightarrow 1$
 $2^\circ \approx 114^\circ \rightarrow 2$
 $3^\circ \approx 171^\circ \rightarrow 2$
 $4^\circ \approx 228^\circ \rightarrow 3$
 $5^\circ \approx 285^\circ \rightarrow 4$
 $6^\circ \approx 342^\circ \rightarrow 4$
 $7^\circ \approx 389^\circ \rightarrow 1$





① Sign of $\sin 10^\circ - \cos 10^\circ$

$z - ve$



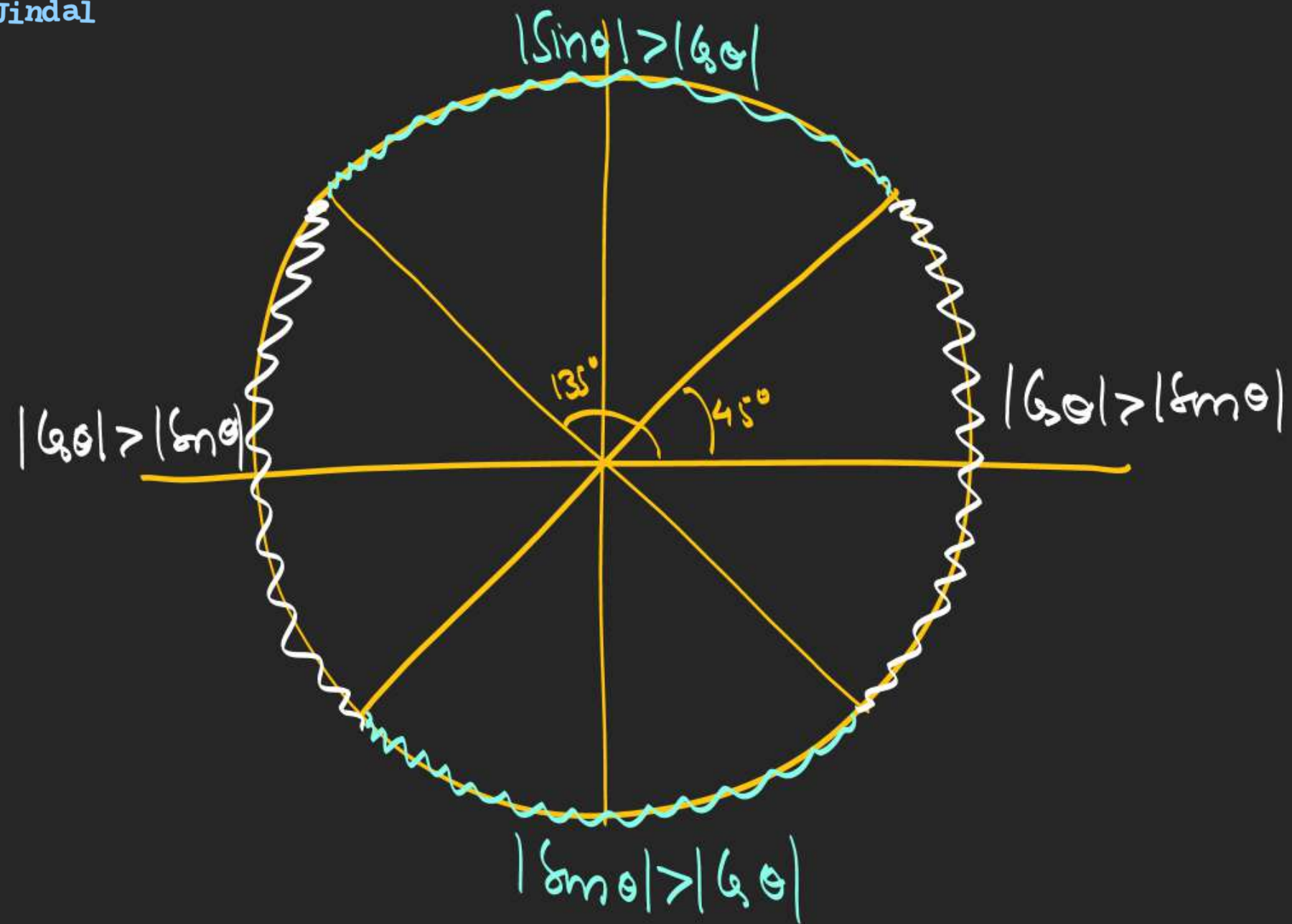
$$\sin 10^\circ - \cos 10^\circ < 0$$

① Sign of $\sin 63^\circ - \cos 63^\circ = +ve$

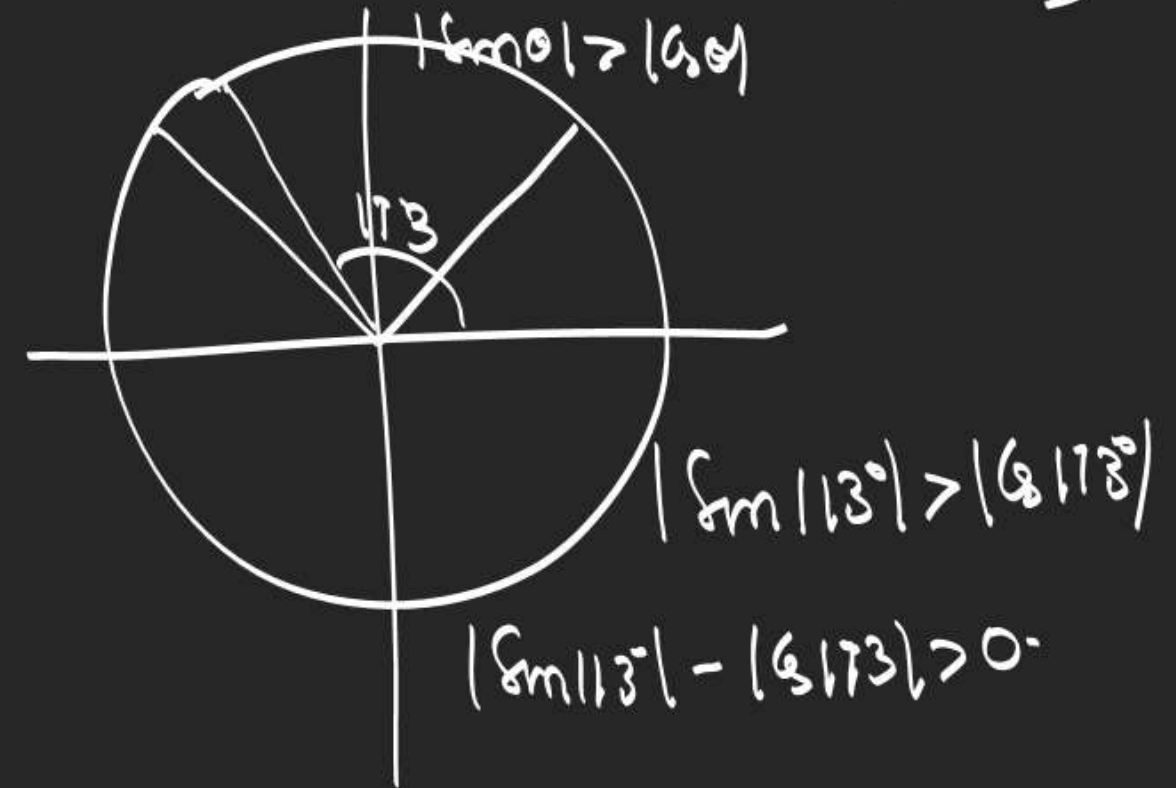
at $63^\circ \rightarrow \sin \theta > \cos \theta$

$$\sin 63^\circ > \cos 63^\circ$$

$$\sin 63^\circ - \cos 63^\circ > 0$$



Q $|\sin 113^\circ| - |\cos 113^\circ|$ is +ve [-ve]



Quadratic Equation

Q. The value of $f(0) + 2f(1)$ is equal to

(A) 45

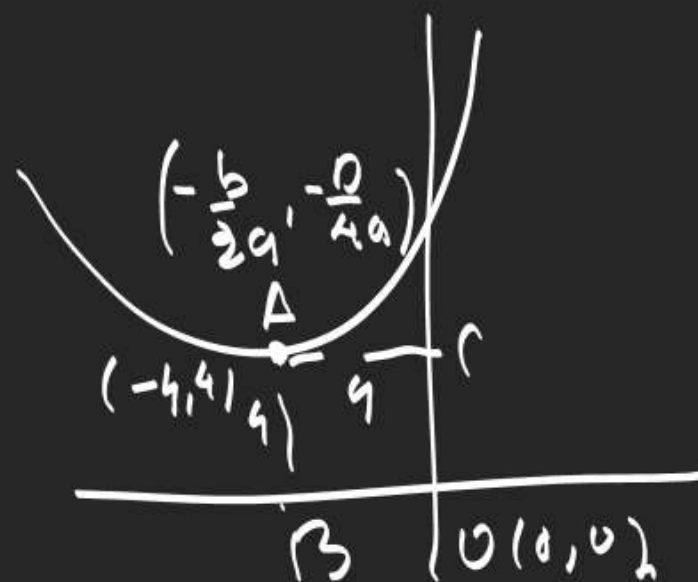
(B) 26

(C) 24

(D) 20

$$f(x) = \frac{x^2}{2} + 4x + 12$$

$$x^2 + 8x + 24 = 0$$



$$\begin{aligned} \frac{-b}{2a} &= -4 & \frac{-D}{4a} &= 4 \\ b &= 8 & \frac{16}{4a} &= 4 \end{aligned} \quad a = \frac{1}{2}$$

$$f(x) = ax^2 + bx + c$$

$$f(AB) = 4, f(AC) = 4$$

$$\begin{aligned} b^2 - 4ac &= -8 \\ D &= -8 \\ a \cdot c &= 6 \\ c &= 12 \end{aligned}$$

Quadratic Equation

Q. If α be one of the root of $f(x) = 0$ then the value of $(\alpha^3 + 10\alpha^2 + 40\alpha + 39)$ is

(A) 0

(B) 9

(C) 10

(D) ~~9~~ - 9

$$\alpha \rightarrow x^2 + 8x + 24 = 0$$

$$\alpha^2 + 8\alpha + 24 = 0$$

$$\alpha^2 + 8\alpha + 24 \overline{) \alpha^3 + 10\alpha^2 + 40\alpha + 39}$$

Quadratic Equation

Q. Range of $h(x) = \left(\frac{3}{2} + a\right)x^2 + (b - 1)x + (c - 6)$ when $x \in [-2, 0]$ is

(A) $\left[\frac{39}{8}, 6\right]$ $h(x) = 2x^2 + 3x + 6$ Range $[-2, 0]$

(B) $\left[\frac{39}{8}, 8\right]$

(C) $[6, 8]$

(D) $\left[\frac{39}{8}, \infty\right)$

Quadratic Equation

Q. If $\sin^2 x + \sin x = (a + 2)$, then which of the following statement(s) is(are) correct?

(A) Number of integral values of a for real solution to exist is 3.

(B) There exists no solution for $a < -\frac{9}{4}$ or $a > 0$.

(C) The minimum value of a for real solution is -2.

(D) Number of prime values of a for real solution to exist is 1.

$$a \in \left[-\frac{9}{4}, 0\right]$$

$$a \in \underline{\underline{-2, -1, 0}}$$

$$\begin{aligned}\sin^2 x + \sin x &= a + 2 \\ (\sin x + \frac{1}{2})^2 - \frac{1}{4} &= a + 2\end{aligned}$$

$$\begin{aligned}-1 &\leq \sin x \leq 1 \\ -\frac{1}{2} &\leq \sin x + \frac{1}{2} \leq \frac{3}{2} \\ 0 &\leq (\sin x + \frac{1}{2})^2 \leq \frac{9}{4} \\ -\frac{1}{4} &\leq (\sin x + \frac{1}{2})^2 - \frac{1}{4} \leq \frac{8}{4} \\ -\frac{1}{4} &\leq a + 2 \leq 2 \\ -\frac{7}{4} &\leq a \leq 0\end{aligned}$$

Quadratic Equation

Q. Let $f(x) = x^2 + bx + c$ ($b, c \in \mathbb{R}$) for all $x \in \mathbb{R}$, attains its least value at $x = -1$ and the graph of $f(x)$ cuts y-axis at $y = 2$. Then

(A) the least value of $f(x)$ for all $x \in \mathbb{R}$ is 1.

(B) the value of $f(-2) + f(0) + f(1)$ equals 9.

(C) the least value of $f(x)$ for all $x \in \mathbb{R}$ is -1.

(D) the value of $f(-2) + f(0) + f(1)$ equals 7.

$$f(x) = x^2 + 2x + 2$$

$$2(x+1)^2 + 1$$



$$f(x) = x^2 + bx + c$$

$x = -1$ is tangent to the curve at $x = -1$

$$f'(x) = 0 \text{ at } x = -1$$

$$2x + b = 0 \text{ at } x = -1$$

$$-2 + b = 0$$

$$b = 2$$

$$c = 2$$

Quadratic Equation

DPP-5

Q. Let $P(x) = x^3 - 6x^2 + \underline{B}x + \underline{C}$ has $1 + 5i$ as a zero and B, C are real numbers, then value of $(B + C)$ is

(A) ~~-70~~

(B) 70

(C) 24

(D) 138

$$\begin{array}{l}
 1+5i, 1-5i \\
 (1+5i) + (1-5i) + \gamma = 6 \\
 \underline{\gamma = 4}
 \end{array}
 \quad \left| \quad
 \begin{array}{l}
 -C = POR = (1+5i)(1-5i) \cdot 4 \\
 = (1+25) \cdot 4 = 108 \\
 C = -108
 \end{array}$$

-108
 $P(x) = x^3 - 6x^2 + Bx - 108$
 $P(4) = 64 - 96 + 4B - 108 = 0 \rightarrow B$

Quadratic Equation

Q. If the equation $x^3 + 2x^2 - 4x + 5 = 0$ has roots α, β and γ , then the value of

$\frac{(\cancel{\alpha^3+5})(\cancel{\beta^3+5})(\cancel{\gamma^3+5})}{13\alpha\beta\gamma}$ is equal to

(A) 5

(B) 8

(C) 12

(D) 15

$$\alpha^3 + 2\alpha^2 - 4\alpha + 5 = 0$$

$$x=2$$

$$x^3 + 2x^2 - 4x + 5 = (x-\alpha)(x-\beta)(x-\gamma)$$

$$8 + 8 - 8 + 5 = (2-\alpha)(2-\beta)(2-\gamma)$$

$$(\alpha^3 + 5) = 4\alpha - 2\alpha^2$$

$$(\alpha^3 + 5) = (2\alpha)(2-\alpha)$$

$$\frac{(2\alpha)(\cancel{2-\alpha})(2\beta)(\cancel{2-\beta})(2\gamma)(\cancel{2-\gamma})}{13\alpha\beta\gamma} = 8$$

Quadratic Equation

Q. Let α, β, γ and δ be the roots (real or non-real) of equation $x^4 - 3x + 1 = 0$. The value of $\alpha^3 + \beta^3 + \gamma^3 + \delta^3$ is equal to

(A) 6

(B) 9

(C) 12

(D) 15

$$\left(3 - \frac{1}{\alpha}\right) + \left(3 - \frac{1}{\beta}\right) + \left(3 - \frac{1}{\gamma}\right) + \left(3 - \frac{1}{\delta}\right)$$

$$= 12 - \left(\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\gamma} + \frac{1}{\delta}\right)$$

$$x^4 = 3x - 1$$

$$x^3 = 3 - \frac{1}{x}$$

$$\alpha^3 = 3 - \frac{1}{\alpha}$$

$$x^4 - 0 \cdot x^3 + 0 \cdot x^2 - 3x + 1 = 0$$

$$\sum \alpha = 0$$

$$\sum \alpha\beta = 0$$

$$\sum \alpha\beta\gamma = 3$$

$$\boxed{\alpha \cdot \beta \cdot \gamma \cdot \delta = 1}$$

Quadratic Equation

Q. If the general expression of degree 2 given by $3x^2 + xy + ky^2 + 10x - 3y + 7$ can be factorised into two linear factors then value of k is

(A) 4

(B) 2

(C) -2

(D) -4

$$\Delta = 0$$

$$4bc + 2fgh - af^2 - bg^2 - ch^2 = 0$$

Quadratic Equation

Q. If α, β, γ are roots of cubic equation $x^3 - 3x^2 + 2x + 4 = 0$ and

$y = 1 + \frac{\alpha}{x-\alpha} + \frac{\beta x}{(x-\alpha)(x-\beta)} + \frac{\gamma x^2}{(x-\alpha)(x-\beta)(x-\gamma)}$ then the value of y at $x = 2$, is

(A) 0

(B) 1

(C) 2

(D) 3

$$0 = x^3 - 3x^2 + 2x + 4 = x^3 - \underbrace{(\alpha + \beta + \gamma)x^2}_{x^3} + \underbrace{(\alpha\beta + \alpha\gamma + \beta\gamma)x}_{x^3} + 4$$

$$2(x^2 - (\beta + \gamma)x + \beta\gamma) + \beta x^2 - 2\beta x + \gamma x^2$$

$$2x^2 - 2(\beta + \gamma)x + 2\beta\gamma + \beta x^2 + \gamma x^2 - 2\beta x$$

$$\underline{(\alpha + \beta + \gamma)x^2 - (\alpha\beta + \alpha\gamma + \beta\gamma)x + \alpha\beta\gamma}$$

$$x^3 - 3x^2 + 2x + 4 = (x-\alpha)(x-\beta)(x-\gamma)$$

$$\frac{8}{(2-\alpha)(2-\beta)(2-\gamma)} = \frac{8}{4} = 2$$

$$y = \frac{(x-\alpha)(x-\beta)(x-\gamma) + \alpha(x-\beta)(x-\gamma) + \beta(x-\alpha)(x-\gamma) + \gamma x^2}{(x-\alpha)(x-\beta)(x-\gamma)} = \frac{x^3}{(x-\alpha)(x-\beta)(x-\gamma)}$$